

POLY-THERM

Fiberglass Jacketed Polyurethane Insulated Piping System

The premium-quality performance piping system for the distribution of liquids from -320°F to 250°F



POLY-THERM® APPLICATIONS

Domestic Hot Water Systems
Geothermal Collection & Distribution
Waste Heat Recovery
Cryogenic Piping
Solar Collection & Distribution

District Heating and Cooling
Process Fluid Transport
Fuel & Heavy Oil Transport
Condensate Return
Chilled Water Distribution

Filament-Wound Fiberglass Jacket

PERMA-PIPE's multidirectional filament winding process produces a high strength fiberglass-reinforced polyester FRP resin jacket over the insulation for maximum insulation protection from the environment. PERMA-PIPE applies this high strength fiberglass jacket to systems having an outside insulation diameter as large as 48 inches. The POLY-THERM jacket is excellent for both below ground and aboveground installations as ultra-violet inhibitors can be added to the resin to retard U.V. degradation for aboveground applications.

Insulation Integrity

In contrast to foam injected insulated piping systems, the POLY-THERM spray process assures void-free insulation. By applying insulation before the jacket is applied, complete visual inspection of the insulation is performed, thus assuring void-free insulation and therefore, maximum thermal efficiency to provide optimum thermal performance for cryogenic and high-temperature distribution systems.

Piping Materials For Any Application

Steel, stainless steel, copper, ductile iron, HDPE, PVC and FRP can all be supplied with the POLY-THERM system. These materials can be supplied in a wide range of sizes with your exact insulation thickness to meet the needs of your application.

Fully Engineered

The POLY-THERM piping system is completely engineered by PERMA-PIPE's experienced engineering staff. Thermal stress, heat loss/gain, soil loading and piece part layout are all completed by PERMA-PIPE. The POLY-THERM system is engineered to reduce field costs by providing custom-made, factory-fabricated fittings to reduce field connections as compared to the field kit method. By using a factory-engineered and prefabricated system, the contractor's time is spent installing pipe, not figuring out where the fitting should be installed and how much pipe to cut.

Steel POLY-THERM
The POLY-THERM steel system can be custom fabricated to job site dimensions.



PVC POLY-THERM
POLY-THERM can be supplied with PVC pipe for chilled water applications.



FRP POLY-THERM
For condensate return and low temperature hot water, POLY-THERM can be furnished with FRP service pipe.



Copper POLY-THERM
The POLY-THERM system can be supplied with Type K or L copper service pipe.



Electric Heat Traced (optional)

PERMA-PIPE provides a complete line of electric heat traced systems for freeze protection, temperature maintenance, heat up and reheat of the piping systems.

Heat traced systems ensure the cost effective, continuous flow of product through your pipeline. These systems supply only the heat necessary for the efficient flow of the product. Because variance is minimized, operating costs

are significantly reduced and time consuming and costly purging of the lines are also eliminated.

PERMA-PIPE's designs incorporate the use of heat traced tubes attached to the product pipe. Maintenance of the heat traced system is minimal; removal of the insulation and jacket is only required at a minimum number of field joint locations.

Contact PERMA-PIPE for more information on this option.

RECOMMENDED POLY-THERM INSULATION THICKNESS

PIPE SIZE (in)	1-6	8-14	16-24
INSULATION THICKNESS (in)			
CHILLED WATER	1	1	1.5
HOT WATER/CONDENSATE	1	1.5	2

TYPICAL PHYSICAL PROPERTIES OF POLYURETHANE AND FILAMENT WOUND FRP

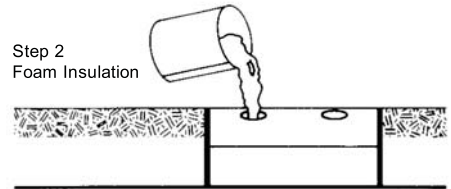
POLYURETHANE		FILAMENT WOUND FRP	
Density	>2.0 lb/ft ³	Flexural Strength	
Compressive Strength		ASTM D-790	25,000 psi
ASTM D-1621	30 psi	Compressive Strength	
(Perpendicular to rise)	25 psi	ASTM D-695	60,000 psi
K-factor (initial @ 73°F)	.16 BTU-in	Tensile Strength	
ASTM C-518	hr-sq ft-°F	ASTM D-638	20,000 psi
Closed Cell		Heat Distortion Temp	
ASTM C-2856	90% Min	ASTM D-648	≥183°F
		Izod Impact	40-60 ft-lb
			in notch

FIELD CLOSURE

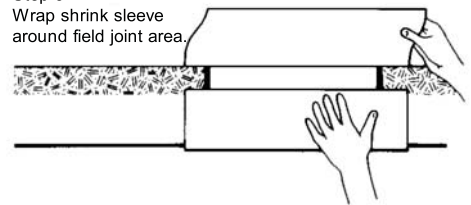
Step 1
Complete service pipe joint.



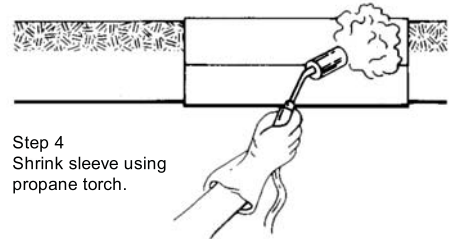
Step 2
Foam Insulation



Step 3
Wrap shrink sleeve around field joint area.



Step 4
Shrink sleeve using propane torch.



GENERAL

All underground and aboveground chilled water, condensate return and hot water lines with fluid temperatures up to 250°F shall be the POLY-THERM type, as manufactured by PERMA-PIPE. All straight sections, fittings, anchors and other accessories shall be factory fabricated to job dimensions and designed to minimize the number of field welds. Each system layout shall be computer analyzed by the piping system manufacturer to determine stress on the service pipe and anticipated thermal movement of the service pipe. The system design shall be in strict conformance with ANS1 B31.1, latest edition. Factory trained field technical assistance shall be provided for critical periods of installation; e.g., unloading, field joint instruction and testing.

SERVICE PIPE*

Internal piping shall be standard weight carbon steel, except for condensate return lines which shall be Schedule 80. All joints shall be butt-welded for 2.5 inches and greater, and socket or butt-welded for 2 inches and below. Where possible, straight sections shall be supplied in 40 foot random lengths with piping exposed at each end for field joint fabrication.

ACCESSORIES

End seals, gland seals and anchors shall be designed and factory fabricated to prevent the ingress of moisture into the system.

INSULATION

Service pipe insulation shall be spray applied nominal 4lb/ft³ density, .16 initial k-factor, polyurethane foam for straight

sections and preformed polyurethane foam for all fittings. All polyurethane foam insulation shall be minimum 90% closed cell. Open cell foams will not be allowed. To ensure no voids are present, all insulation shall be inspected by one of the following three methods: visually checked prior to application of the protective jacket, infrared inspection of the entire length, or x-ray inspection of the entire length. The insulation shall be applied to the minimum thickness specified below. The insulation thickness shall not be less than indicated in these specifications.

Pipe Size (in)	Insulation Thickness (in)	
	Chilled Water - Hot Water	
1 - 6	1	1
8 - 14	1	1.5
16 - 24	1.5	2

PROTECTIVE JACKET

All straight sections of the insulated piping system shall be filament wound, polyester resin/fiberglass reinforcement composite directly applied on the insulating foam. Thermoplastic casing material, e.g., PVC or PE, shall not be allowed.

The minimum thickness for FRP jacket shall be as follows:

Jacket Diameter	Thickness (in)
Up to 15 inches	.055
Between 15 & 24	.085
Between 24 & 30	.110
Between 30 & 48	.140

All fittings of the insulated piping system shall be prefabricated to minimize field joints and jacketed in a chopped spray-up, polyester resin/fiberglass-reinforced composite, directly applied onto the insulating foam to a thickness related to the filament-wound jacket thickness.

FIELD JOINTS

The internal pipe shall be hydrostatically tested to 150 psig or 1.5 times the operating pressure, whichever is greater. Insulation shall then be poured in place into the field weld area. All field applied insulation shall be placed only in straight sections. Field insulation of fittings shall not be acceptable. The installer shall seal the field joint area with a heat shrinkable adhesive-backed wrap or with wrappings of glass reinforcement fully saturated with a catalyzed resin identical in properties to the factory-applied resin. Backfilling shall not begin until the heat shrink wrap or the FRP lay-up has cured. All insulation and coating materials for making the field joints shall be furnished by PERMA-PIPE.

BACKFILL

A 4 inch layer of sand or fine gravel shall be placed and tamped in the trench to provide a uniform bedding for the pipe. The entire trench width shall be evenly backfilled with a similar material as the bedding in 6 inch compacted layers to a minimum height of 6 inches above the top of the insulated piping system. The remaining trench shall be evenly and continuously backfilled in uniform layers with suitable excavated soil.

*For alternative service pipe selections, contact PERMA-PIPE for specification details.



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